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Editorials.

A REJUVENATED NATIONAL VETERINARY ASSOCIATION.

If the recent meeting of the National Veterinary Association can be taken as any criterion of future work, it may at last safely be surmised that its officials have awakened to the needs of the profession and to the value which can be made of the Association in supplying those needs. The Association has been asleep far too long, and therein has lain, to a very great extent, the want of support from the profession, as evinced by its miserably small membership roll. To merely meet once a year, and even then to take no active part in the advancement of the everyday affairs of the professional body, was not doing " the greatest good for the greatest number," and the affiliation unto itself of the various local veterinary societies marks a new era which should be beneficial to the latter and reflect credit upon the parent Society, if only the scheme is taken advantage of.

Matters of professional import, sent forward by one or more societies, will be considered by the whole Council of the National summoned for the purpose ; and their support, if accorded, representing such a large proportion of the profession, cannot but strengthen the hands of the Council of the Royal College in any measures they bring before Parliament or other public bodies.

Such important matters as the recent Veterinary Surgeons' Act Amendment Bill, the Animals Anæsthetics Bill, and those which are now being dealt with by the Ministry of Food, the present Milk and Dairies Bill, the Meat Inspection question, and a hundred and one others, are all matters which concern the profession as a whole, and, therefore, should have universal consideration amongst its members. Matters of vital importance should be discussed by every branch society or group of societies, and resolutions should then be forwarded for the further consideration of the Council of the National, who, in their turn, should pass on their decision to the Council of the Royal College. In this way we should get the collective vote and support of the whole profession, a consideration no public body could afford to ignore.

PRACTICAL DEMONSTRATIONS AT VETERINARY MEETINGS.

THE value of practical demonstrations, and the appreciation by the members of this form of instruction, has for many years been insisted upon in the Editorial columns of THE VETERINARY JOURNAL, and no better evidence of its value can be deduced than the two recent enthusiastic meetings of the National Veterinary Association at Edinburgh and the meeting of the Royal Counties Veterinary Medical Association at the Army Veterinary School, Aldershot. On each occasion a number of operations and practical demonstrations of equal interest both to the general practitioner and to those engaged in microscopical work or other special branches of the profession were provided, the programme being carried out by experts in each particular branch. Enthusiasm prevailed everywhere, and there was not a dull moment from start to finish. If only those amongst ourselves who are inclined to " run down " our profession would take the trouble to support such gatherings with their presence and our societies with their subscriptions there would be less inclination to belittle our profession and to recognise the value of the scientifically trained man—indeed, to go further, and recognise that the properly trained veterinarian is as necessary to the well-being of every country where animals exist, not only for their benefit, but also because of the intimate relations, in so many instances, between the diseases of animals and the diseases of man.

DRUG CONTROL.

No veterinary surgeon can be in practice long without coming to the conclusion that many of his patients have been wrongly treated by drugging before his arrival on the scene, and in not a few cases animals are killed by constantly drugging for complaints which have been wrongly diagnosed or never existed. Canine patients probably get the largest share, and " worms " are the most frequent fairy tale, whilst treatment for loss of appetite in both horses and dogs forms a good second.

Curiously enough societies exist which seek to hamper scientific men in conducting their investigations, but none exist to check Tom, Dick and Harry from experimenting on animals with all sorts of drugs, and in their ignorance inflicting unnecessary pain and suffering upon them.

Our French confreres have arranged things very differently, and a step in the control of drugs with the avowed object of *protecting the public health* has been made by the carrying into effect of a decree promulgated on September 14, 1916, by the Ministry of Agriculture. By this decree the right to keep, prescribe and deliver toxic sub stances is limited, and it is forbidden for a druggist to sell, for the treatment of animals, certain poisonous substances named in a published list (preparations of arsenic, aconite, atropine, cantharides, chloroform, digitalis, ergot, opium, nicotine, savin, strychnine, morphine, cocaine, etc., etc.) without a prescription from a veterinary surgeon. Where a druggist and a veterinary surgeon both reside in a town or village the druggist only must keep and dispense the drugs which the veterinary surgeon has to order. It is only in well indicated cases that the veterinary surgeon can keep any of the list of drugs which he wishes to administer himself to the animals of his clients. When certain of these poisonous substances are sold they must have on a firmly adherent label with the name and address of the *authorised* veterinary surgeon, the name of the substance as given in the printed list, the prescription number as given in the veterinary surgeon's register, a plain indication that it is a *veterinary preparation*, and the word " poison."

There are many minor points of importance under the decree that have to be carried out by the chemist and veterinary surgeon jointly or independently, but the whole object of the order is to put the treatment of animals into the hands of skilled and scientific men and to abolish quackery and drug peddling by any ignorant or self-assertive charlatan.

Original Communications.

SOME OBSERVATIONS ON THE ROUTINE FEEDING OF MILITARY HORSES ON HOME SERVICE.

By Lieut.-Colonel H. WATKINS-PITCHFORD, C.M.G., F.R.C.V.S., F.R.S.E.,
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The points dealt with below are as follows :

(*a*) The employment of Cooked Food.

(*b*) The feeding of Crushed Oats as compared with the uncrushed grain.

(*c*) The use of Long Hay as compared with Chaff.

These points are sought to be illustrated by tabular statements and details of technique in the Schedules as follows, viz.:

Schedule A.

(1) The Employment of Cooked Food.
(2) The Feeding of Crushed *v.* Whole Oats.
(3) The Use of Long Hay as compared with Chaff.

(1) Weight Table, Cooked *v.* Raw Food.
(2) Table of Specific Gravities in Fat and Thin Horses.
(3) Scale of Rations adopted and analysis of same.
(4) The Amylolytic action of Equine Saliva.
(5) Table of heights and weights of various Army classes.

Schedule B.

(1) Chart of Weights, Whole *v.* Crushed Oats.
(2) Time of Consumption of Whole *v.* Crushed Oats.
(3) Vitality of Undigested Grains.
(4) Percentage of Oats Escaping Digestion.
(5) Effect of absence of efficient Tooth-action on Oats.

Schedule C.

(1) Times of Food Mastication.
(2) Photograph of lengths of Fibre in Chaff and Long-hay Faeces.
(3) Chart of Weights, Long *v.* Short (Chaffed) Hay.
(4) Composite Chart to show possible weather influences.
(5) Accelerating effect of Exercise on rate of Bowel Content.
(6) Rates of Feeding of Bran-and-Oats *v.* Chaff-and-Oats.

1. The subjoined report is intended to deal with certain details of procedure in connection with the feeding of the Army horse under conditions of home service. These observations have been delayed owing to various causes incidental to the establishment of the present Research Institution, and the need for the recapitulation of some findings which appeared uncertain in significance.

2. The main part of the work was intended to ascertain the facts underlying such ordinarily-accepted details of stable management as the advantage attending (*a*) the employment of cooked food; (*b*) the feeding of crushed *v.* whole oats; and (*c*) the utility of chaff as compared with long hay.

3. Points other than these, however, have been attempted to be dealt with where they seemed to have any connection with the main enquiry, and in this way such observations are included as the times taken in food consumption, rates of passage of ingesta through the gastro-intestinal tract, some observations on mastication and salivary digestion, effects of external temperature, etc., subjects having an indirect bearing upon the main enquiry and, as such, brought under review.

4. The text of the report comprises only such matter as has seemed necessary to the elucidation of the subject, all details of technique, charts, weight-curves, etc., being attached as Appendices. This has been done in the endeavour to avoid obscuring the issues which form the subject matter of the enquiry.

5. The main points sought to be determined were, as stated in paragraph 2, the practical utility underlying the routine stable procedure of :—

(*a*) Feeding boiled food to the horse.
(*b*) Of crushing the oats given in the feed.
(*c*) Of chaffing the hay.

None of these details are, as a routine practice, to be carried out without the expenditure of time, trouble and expense, but claims as to the advantage to be secured by their adoption have been widely accepted, more perhaps upon grounds of time-honoured stable procedure than for reasons of proved and practical utility.

6. *The question as to whether advantage attends the use of cooked food* in the place of, or as a supplement to, the ordinary uncooked ration of the horse.

Opinions have varied much in the past as to the utility of boiled food for the horse, and considerable diversity of opinion still exists.

Observation of horses receiving routine feeding with a liberal dietary of cooked food shows that without doubt certain physical changes are produced. Increase of body-weight and an increased roundness of muscle-contour and sleekness of coat, serve to produce, when well established, the appearance known as " dealer's condition,"

in which state an animal is presumed to be of enhanced appearance and market value.

7. It is generally accepted that this increase of so-called condition is due to the deposition of fat within and upon the various organs and tissues of the body. In the endeavour to increase the condition in question it is usual to restrict the exercise of the animal to a minimum and so, by reducing the general tissue-waste, to deposit fat at its expense.

8. This theory is doubtless correct in the main, but it falls short in some respects. The results of tests made in the endeavour to prove the practical utility of cooking food (Schedule A, 1) show that an increase of weight attends the use of boiled food even where the routine work of the animal continues to be performed. At the same time the corresponding Control animal on dry food maintains its normal equilibrium. The factor alone of retarded tissue-waste brought about by absence of work fails therefore to account entirely for any recorded increase of weight attending the use of cooked food, inasmuch as such increase takes place when normal work continues to be performed.

9. If the explanation of increased weight is sought in the theory that increased water is necessarily ingested with food in a cooked state, several difficulties arise in acceptance of such explanation. The mechanism of adjustment between the intake and excretion of fluid is a very exact one, excess of water over and above the tissue requirements being rapidly eliminated in the normal animal. If the increase of weight and roundness of contour of the animal habitually fed on cooked food is due, therefore, to the retention of an excess of water in its tissues, it must be assumed that some state of physiological adaptation has become established by which the tissues of the animal have accommodated a percentage of water in excess of their normal content. That such tissue accommodation is a normal and physiological rather than an incipient morbid state would have to be taken for granted, inasmuch as no departure from the normal physical state is evident, nor does tendency to oedema of the extremities or " pitting on pressure " of other parts exist in the animal in " dealers' condition." Tendency to accumulation of water in the tissues of animals habitually feeding on succulent material containing high percentages of water does not exist in the normal state, nor does it seem possible that such condition could become established in the presence of a normal kidney and skin function. Conversely, it is generally accepted that adipose tissue—such as is present to a greater or lesser extent in the class of case under consideration—exists at the expense

of, and, as it were, in inverse ratio to, the percentage of water contained in the animal's tissues (*vide* A, 2). The ease with which a horse will sweat when in so-called " gross " condition is, in itself, no conclusive evidence of the presence of excess water in the system, as the same phenomenon, *viz.*, sweating, is evolved in physical states varying from, and sometimes directly opposed to, the condition in question. Nor has it been shown, so far as the writer knows, that, apart from that in the digestive tract, the mere presence of an excess of fluid in the system —presuming such is possible to exist in normal states—governs or even indirectly stimulates the complex nervous mechanism which regulates the excretion of sweat.

10. This question as to whether in the " gross " animal the increase of bulk and weight is due merely to the presence of water, may appear unduly laboured, but the practical conclusion which is sought to be determined appears to warrant a full review of all points. If the increase of weight and apparent improvement of condition attending the use of boiled food is a disability due merely to the presence of increased water in the tissues, the question is obviously different to one in which the condition in question connotes a state of improved metabolism or an increase of potential energy due to fat storage.

11. If, therefore, such increase of weight and condition attending the use of boiled food is due to the deposition of fat and not to restricted exercise or mere accumulation of water in the tissues, such increase can only have become established by an increased state of digestibility or net availability of the constituents of the cooked food, permitting more complete assimilation of these constituents than is able to be achieved by the control animal receiving raw food.

12. The endeavour to determine the general effect of feeding with cooked food was made by recording, at three-day intervals over a considerable period, the weights of a number of horses, half of which were fed with cooked food, while the other half—which acted as controls—received an equal amount of food in an uncooked state, the quantities in each case conforming to the scale of service rations issued at the time (A, 3). After feeding in this manner for a period of two months a change was made and the controls received the cooked food, while the original test animals returned to the normal ration. This latter arrangement remained in force for a period about equal to the duration of the former test, and throughout the whole experiment observations on condition and body-weight were carefully recorded in both groups.

13. Examination of the Charts of Schedule A, 1, will show the marked and prompt effect attending a course of boiled food, and it further serves to show that the physical result, though marked, returns rapidly to the antecedent normal condition when the food ceases to be cooked.

14. The cause of so rapid an increase is not easy to determine, and although in the metabolism of fat-production the influence of the carbo-hydrate principle is recognised as the determining factor, the ration shown (A, 3), with a starch equivalent of at most 10 lbs., would seem quite inadequate to the furnishing of such quantities of fat in so short a time, nor if such were possible could the equally rapid loss of body-fat attending discontinuance of boiled feeding be easily explained.

15. Difficulties therefore exist in accepting the sudden rise and fall of the weight in question as due either to fat formation or increased tissue water, and the question arises as to whether some other factor in connection with the complex metabolism of food digestion may not be found to explain the phenomenon. That formation of fat, and not accumulation of water, does take place under the conditions producing the so-called " dealer's condition " is undoubted, fat being deposited in well-organised layers and accumulations,* but such process must be a matter at least of weeks and not days.

16. The theory of an increased co-efficient of digestibility by which a greater percentage of the food becomes available through the process of cooking, is also not without difficulties of acceptance as a satisfactory explanation, although the action of heat upon the starch and cellulose elements of the food would undoubtedly tend to increase the availability of the contained nutriment by prompting disintegration and the conversion of starchy principles. Against such advantage, however, would have to be placed the fact that cooking tends to lower rather than promote the digestibility of the crude protein of the oat and hay. †

*In a horse in this condition, the " rolling " sensation imparted to the fingers on handling the ribs and back are found due to the presence of a single layer of fat deposited upon the *latissimus dorsi* and *external oblique* muscle of the ribs, and below the panniculus muscle, no obvious accumulations of fat existing under the skin, or in other sites than within the abdominal cavity, and, to a lesser degree, round the heart. No great differences exist in the actual specific gravity of the muscles of such a fat subject and the corresponding muscular tissue of a horse in a state of extreme emaciation.

† In this connection it is interesting to note the variance of opinion existing in veterinary physiology concerning the starch-converting property of the horse's saliva, the presence of the active enzyme " ptyalin," having either been questioned or stated to exist only intermittently. In order to observe this point of the amylolytic action of equine saliva, a number of horses (10) were tested at this Laboratory, their saliva being examined as to the presence of

17. It is, perhaps, hardly essential to the object of the report to show definitely which of the foregoing causes were concerned in the production of the increase of body weight under consideration. The exact determination of this point is now being attempted, and a final report will be submitted on the conclusion of the observation. It seems sufficient for practical purposes to show that a definite *rationale* underlies the use of boiled food, and that by this means a pronounced "alternative" effect is undoubtedly produced in the system of the horse.

18. The marked rise in the weight-curve which occurs in the horses habituated to dry food for a long period (*vide* Chart A, 1, April 18) demonstrates this fact better than in the earlier case of animals put on to boiled food (February 17) after a short observation period of two weeks. It is interesting to note also that the maximum physical effect—as reflected in the body-weight—would seem to have been attained after five or six weeks and that the weight-increase after that period ceases.

19. The increasing external temperature which apparently tends to produce an upward curve of the dry-feed line about the end of March seems to produce no parallel effect in the case of the boiled food, and the writer is at a loss for an explanation of this difference, as the two groups of cases (test and control) were maintained under conditions which were identical in all respects, other than the difference in their food.

20. The fall of weight which ensues rapidly upon the cessation of the special feeding appears an indication of the inapplicability of boiled rations in the case of the average normal working horse where it is desired to maintain a constant standard of efficiency. No great difference in the appearance of the two groups of horses was observable at the conclusion of the test, and, when worked in pairs (that is, one test animal and one control in harness together), no obvious difference in performance was noticed. It would appear, nevertheless, an impractical and unsound system whereby horses are brought into a condition of unstable weight-equilibrium and only maintained there at the cost of artificial dieting, even if by such treatment their capacity for work is to some extent increased. When, however, this advantage cannot be claimed, and the disadvantage of loss of condition

ptyalin immediately before feeding (when the salivary glands were in a condition of excitation) and half an hour after finishing an ordinary feed. Reference to Schedule "A," No. 4 shows that in all cases, both before and after food, the saliva contained a ferment capable of reducing starch to maltose or erythrodextrose dependent upon the percentage in which the saliva was added to the starch solution. The activity of equine as compared with human saliva was, however, considerably less within the time observed.

upon discontinuance of special conditions of feeding must be entailed, the general undesirability of boiled food for the average working horse in normal health must be concluded.

21. Where however abnormal states of health and condition obtain the question is a different one, and the adoption of the system would appear fully justified in sickness and convalescence where rapid alterative and restorative effects are sought.

B.

The Feeding of Crushed *v.* Whole Oats.

22. Greater variance of opinion exists as to the utility of crushing oats than attends the question of the advantage of cooking the food of the horse. The subject is here attempted to be dealt with in such a way as to furnish ground for an accurate decision of the question. Several points claim consideration, but the primary one from the point of view of this report is a determination as to whether an increase of feeding value is found to attend the process of crushing.

23. On this point of increased nutritive value or "availability" of the crushed corn differences of expert opinion have existed. Such differences are very briefly reviewed as follows:—Gay records that in horses fed with whole oats 64 per cent. of the grain was digested, while 72 per cent. was digested when coarsely ground. Kellner showed a saving of .5 to 1.6 per cent. by crushing. Jordan found an increase of digestibility amounting from 3 to 14 per cent. Against such findings can be placed the conclusions contained in the Wisconsin Bulletin 275 of 1917, where a thorough test was made during the spring and summer with eighteen working horses under carefully controlled conditions, with the result that, while the horses to which oats were fed lost only 8.3 lbs., the animals receiving a ration of crushed oats 10 per cent. less in quantity than the uncrushed ration lost 38.5 lbs., the final conclusion of the observers being that "unless oats can be crushed for considerably less than 10 per cent. of the cost of the whole oats such preparation will not pay even for horses at hard work."

24. The conjectural nature of the advantage attending the process of crushing tends to be borne out by the present findings, and the writer has no strong or practical arguments to advance in favour of the procedure, while valid objections of greater or less weight can be advanced against it.

25. The present attempt to show any difference subsisting was made by recording weighings, in a similar manner to those employed with

the former test. Ten horses were fed with well-crushed oats and ten horses were maintained on whole oats as controls, both receiving identical treatment in other respects. The black line of the Chart B, 1, indicates the weighings of the whole-oat or control horses, and it will be noticed that though the average combined weights of these controls was at the commencement some 15 lbs. below the combined weights of the crushed-oat horses this black line tends gradually to surmount the red line, indicating—so far as actual body-weight is concerned—a slight balance in favour of the whole oat. On April 14 the diet was reversed and the animals which had received whole oats had their corn crushed. Conversely the horses which for two months had been fed on crushed oats were changed abruptly to whole grain.

26. The points which seem worthy of noting are (*a*) no falling off is observable in the animals long habituated to crushed grain when they are suddenly put on whole oats. As a stable procedure this has generally been considered inadvisable if not risky, the horse being credited with "bolting" whole grain when not used to the same, with the attendant consequences of colic and loss of condition. That such impression is mistaken when applied generally will be seen on reference to Schedule B, 2, where it is shown that, though the times of deglutition of a corn feed vary within considerable limits, the average time spent by 25 horses in consuming a feed of whole corn is greater than the time taken in eating the crushed oat feed. No consequent "slump" therefore appears to attend the reversion from the artificial to the normal conditions of feeding, such as was noticed in the case of the horses habituated to boiled food.

(*b*) 27. The second point noted in attempting to interpret the weight-curve B, 1, is the slight improvement which ensues in horses long habituated to whole corn when the latter is crushed* (April 14). No such upward curve is to be noted at the commencement of the experiment on February 17, which would seem due to the same factor, as noted in the weight-curve of Schedule A, *viz.*, insufficient length of the period of observation (two weeks) in which to establish habituation to environment (constant conditions).

28. A general survey of weight-curve B, 1, leads to the conclusion that a slight advantage does attend the feeding of crushed oats to horses. The advantages, however, are only slight, and it is

* It might here, perhaps, be noted that the betterment brought about by the conditions of exactness demanded by the experiment in the matter of regularity of feeding, exercise, etc., was noticeable in all the 60 odd horses under critical observation. Regularity of habit in the human subject has been recognised from time immemorial as conducive to optimum conditions of health; a principle of hygiene which probably applies not only to the horse, but throughout the animal kingdom.

difficult to find the underlying reason. Theory has always held that the disintegration of the grain by crushing exposes the interior of the corn to digestive fluids more thoroughly than occurs in the case of the whole oat. Theoretically this should be so, but practical observations show that the percentage of oats which escape the grinding action of the molar teeth is almost negligible, while examination of such oats as have passed through the digestive process shows that a very thorough exposure of their internal structure to intestinal juices has taken place. Only occasionally will it be found that an oat-grain so escapes the action of the teeth and the gastro-intestinal juices as to be capable of subsequent germination. The highest percentage among ten such trials was only .075 per cent. (*vide* B, 3). Of the number of grains so incompletely disintegrated as to retain the appearance of a whole corn only a small percentage could be recovered (varying from .097 per cent. to 2.2 per cent.) in some twenty examinations (*vide* B, 4).

29. That the efficiency of this disintegration depends upon the efficiency of the teeth and does not rely to any extent upon the solvent action exerted by the stomach or bowel, seems clear from the table shown (B, 5) in which a known number of oats (coloured in such a way as to be recognisable on leaving the body) was introduced into the horse's stomach in the form of a bolus, thereby avoiding the action of the teeth. It will be seen that a large percentage of these grains were recovered finally in a whole state.

30. Recognition of this essential function of the teeth—which receives an added significance in view of the diastatic action of the saliva (footnote paragraph 16) — affords what seems to be the only valid argument to be adduced in favour of the adoption of the practice of crushing oats. Where the teeth are in a normal condition such procedure is unnecessary, but where impairment of function exists through age or accident, or where dentition changes are occurring in the molars of the young animal—from the first to the fourth year—the practice of crushing finds its justification.

31. Advantage may also fairly be claimed for the process in states of sickness, debility or convalescence, but the total sum of advantages is not a large one, while there are attendant disadvantages which must be placed to the other side of the account. Oats are not to be efficiently crushed without expenditure of time and trouble. Hand machines are out of the question where any large numbers of horses have to be provided for. If oats are supplied by contractors in a crushed state the uncrushed oat cannot be inspected, and the greatest safeguard is thus then removed whereby only sound corn reaches the horse. In any case, the factor of cost, or its equivalent in time,

must be considered. It is generally computed that the expense of bruising is approximately 10 per cent. of the cost of the grain, including the extra cartage involved. This figure seems approximately correct for the purposes of the question under consideration where oats ready-crushed may have to be supplied to the service. Where the unit concerned undertakes its own crushing the liability is not, of course, so great.

32. Besides questions of cost must be reckoned the drawback—especially from a military point of view—of increase of bulk. Oats occupy approximately 75 per cent. more space when crushed than when whole. From a transport point of view such consideration is an important one.

33. The hygroscopic, or water-absorbing, power of the crushed grain is considerable. If storage room has to be provided it is essential that it should be dry. In tests made at this laboratory it has been noted that the crushed oats, which contain only 10.15 per cent. of moisture on being crushed, rapidly absorb water—from an ordinary stable atmosphere—until they contain 31.75 per cent. at a time that a control test of whole corn rose only from 10.15 per cent. to 14.5 per cent.

34. The writer concludes, therefore, that the system of crushing or bruising the oats fed to the Army horse seems, with the exceptions mentioned in the immediately foregoing paragraphs, devoid of sufficient utility to justify general adoption.

The Utility of Chaffing Hay.

35. Most practical horsemen endorse the system of cutting or chaffing the hay fed to a horse when oats or other corn are fed at the same time. The main advantage held to accrue from the mixing of the corn with a bulk of chaff is that the animal takes longer in feeding and the oats become, in consequence, more thoroughly broken up and exposed to the action of the digestive juices.

36. Experimental observation tends to confirm the soundness of such a view, and it is interesting to note the differences in the time taken in consuming feeds containing chaff as compared to the time taken where long hay is given in the place of chaff, or where the corn is given by itself. Reference to Schedule C. 1, shows that the time taken in the mastication of a feed of oats is more than doubled when the corn is mixed with half its weight of chaff, and this delayed action is observable as much in the case of the rapid eater (" greedy feeder ") as in the case of the more deliberate one. This table shows that the average time taken in consuming a feed (of 4 lbs. of whole corn mixed

with 2 lbs. of chaff) was 47½ minutes, whereas an equal amount of corn fed without chaff was consumed in about 20 minutes. With crushed corn these times were slightly shortened, a fact which does not accord with the prevalent notion that the horse is liable to shorten the period of mastication—" bolt his corn "—when given whole oats without chaff.

37. This " restraining " action of the chaff as exerted upon the corn is probably the only useful purpose it serves, as there would seem to be no appreciably increased digestive action exerted by the digestion upon the chaff, over and above that taking place in the case of long hay. This would appear to be borne out clearly by the photograph (C, 2), which shows the actual length of the fibre of long hay and of chaff after leaving the body. It is difficult to determine from observation of the material in question whether it was fed originally in the form of chaff or long hay. If, therefore, the horse naturally chaffs his long hay as completely as the chaff-cutter there would appear no object in the mechanical process other than that resulting in a more deliberate grinding by the teeth and a more prolonged contact with the salivary secretion.

38. Apart from this restraining action there appears little to urge in favour of chaffing. The possibility of feeding indifferent hay in the form of chaff when it would be refused by the horse in a long state is, of course, a questionable advantage.

39. From inspection of Chart C, 3, it is evident that long continued feeding on chaff only does not impair the horse's ability to deal with long hay when the latter is made suddenly to replace the chaff (*vide* change on April 7), while, conversely, there appears some reason to conclude that the control animals—which for some months had received only long hay—did not adapt themselves without some difficulty to the change from long hay to chaff.

40. Nor can it be urged against chaffing that the horse in grinding or cutting the long hay wastes energy upon maintenance which might otherwise be applied to dynamic purposes, for, as has been shown above, the feeding of chaff does not exempt it from the same prolonged chewing as that which long hay receives.

41. While such objection fails to be sustained it must be admitted on the other hand that, as far as can be judged, horses prefer hay to chaff and find satisfaction in the more natural act of seizing and chewing the longer fibres of the uncut hay. This is, perhaps, in parallel with the satisfaction—or at least complacency—shown by the ox when re-chewing its food during the act of rumination.

42. Apart, therefore, from the time and expense entailed by chaffing it is concluded that chaff serves no purposes beyond the exertion of a retarding effect upon the mastication of the corn. Other than this passive—though important—effect it would appear to serve no useful end.

In attempting the interpretation of the weight-charts included in the Appendix, it appears necessary to construe the curves shown in conjunction with the weather conditions obtaining at the time. A composite chart, therefore, is attached (Schedule C, 4) showing the average weights of all the horses (both test and control) throughout the period, and against this curve is plotted the average daily temperature curve. A general correspondence appears possible between an increasing weight and an increasing daily temperature. It would, perhaps, be anticipated that the increasing external temperature would divert some of the food constituents from the thermic into the dynamic form of energy, or, in other words, the lessening call upon the food for heat maintenance would result in fat or weight production. This seems to be the case, at any rate in the horse, and is, perhaps, an explanation of the increased well-being generally observable throughout the animal kingdom in the spring time of the year.

APPENDICES.

Schedule A (1).

It will be noted that the average weight of the test horses (shown as a heavier dotted line) at the commencement of the experiment was 21 lbs. below the average weight of the control animals, and that this difference was maintained during the initial period two weeks (February 3—17), during which period both test and controls were receiving the normal service ration uncooked.

Four days after the administration of the cooked food to the test horses their average weight tends to approximate that of the controls, and from then for a period of about six weeks they tend to equal or exceed the weights of their controls. After this period, however, the controls (on dry food) commence to rise and again surmount the test animals (a change due, apparently, to the increasing external daily temperatures by which less energy was required to be expended upon the raising of cold food to body temperature with a resulting reduction or lessening of the maintenance requirements of the body and a consequent increase of weight). This seems the only explanation of the rise in the dry-food line about this period.

At the expiration of two months (April 14) the conditions are abruptly reversed and the horses long habituated to warm cooked

food suddenly receive ordinary dry food, while the controls habituated to dry food receive the warm cooked food. The result here is two-fold and marked, resulting in a few days in a gain to the boiled food of about 28 lbs. on the average, while the horses suddenly returned to dry food lose almost as much weight within a similar period.

The practical significance to be attached to such facts is not easily apparent. Two points are of special interest, firstly, the marked result of sudden change of food-habit. This is seen best attending the second change of food on April 14. At the first change there was lacking the influence of long-sustained routine treatment, the animals had come from varying localities and were convalescing from differing disorders. The 14-day preliminary observation period was probably too short to establish the impress of an environment in which sustained and constant conditions obtained. The result of the first change, therefore, is less marked than that of the second. In the latter case, however, both test and control animals are involved in an abrupt food change and the consequent divergence between the two groups is more pronounced.

(*To be continued.*)

AN INTRA-DERMAL PALPEBRAL REACTION.

By HOWARD B. COLLETT, B.V.Sc. (TORONTO), M.R.C.V.S.
(*late Captain, Royal Army Veterinary Corps*).

THE photograph opposite shows a very typical and characteristic reaction to the mallein test. After the signing of the Armistice our division (54th) was brought back from Syria to Egypt, and stationed at Helmieh, just outside Cairo. Soon after our arrival there mallein-ization of all animals in the division took place. The subject of the illustration, a light draft horse belonging to H.Q. 161 Infantry Brigade, gave the following reaction :—

At the 24th hour after injection (9 a.m., December 19, 1918), there was swelling of the lower lid, very tense and painful, and accompanied by a slight muco-purulent discharge from the eye. By the 36th hour, the reaction was very noticeable, the upper eyelid was swollen, and the discharge from the eye was much increased. At the 48th hour the reaction was still more marked: both eyelids were very swollen, and the discharge adhering to both lids had partly gummed them together. The eye could hardly be seen. At the 60th hour the reaction was stationary, but by the 72nd hour it had commenced to subside. Shortly after this the animal was destroyed.

CONJUNCTIVITIS—A COMPARATIVE STUDY.

By G. GAIR, M.R.C.V.S.
Conon Bridge.

Inflammation of the conjunctiva may be of bacterial or traumatic origin, or it may only be a secondary manifestation of primary foci elsewhere.

The mechanism concerned in the movement of the eyelids is one of great physiological interest. One has only to look microscopically at the picture of the palpebral conjunctiva and note the structure of the stratified epithelium and subepithelium supporting the vertically arranged vessels with the lymphoid follicles, and particularly the plexes of nerve films, to know what a highly sensitive membrane the conjunctiva is, and with what extreme rapidity such a delicate structure may become affected. The infective process may develop so rapidly that, unless checked, removal of the eyeball may have to be adopted.

Considerable opportunities were offered to me for examining a large amount of morbid material from the eye of the human subject, of the horse, ox, and dog, and it may be of interest to know the various infective agents commonly met with, and the situations of the eye in

which they were found. Some of the infecting agents are : *Staphylococcus, Streptococcus, Pneumococcus, B. Coli, M. Catarrhalis, Koch Weeks bacillus, Morex-Axenfield bacillus, Friedlanders bacillus, B. Pyocyanus, B. Tuberculosis,* and *M. Gonococcus.*

Organisms affecting the eye are, as a rule, hæmophillic, and some also require special media for their culture. It is, therefore, essential to use blood agar and serum agar in making bacteriological examinations in cases of eye infections. Koch Weeks bacillus grows freely only in the presence of blood serum. The vitality of this organism being slight, immediate transference of the material is necessary. Many of the hæmoglobinophilic bacteria will grow with only 1 in 500 hæmoglobin. Smears from the conjunctival secretion show Gram negative bacillus within pus cells, as well as some lying free. The period of incubation with this organism is short, 12 to 36 hours. These are important factors in spreading this disease in Egypt. The Diplobacillus of Morax causes a mild blepharo conjunctivitis at the internal angle of the eye. They occur in pairs, and are 1η to 2η long. They form little pits of liquefaction in Lófflers serum within 24 hours, and the fact of their becoming confluent may be looked upon as characteristic. They do not neutralise agar.

A somewhat common form of Staphylococcal conjunctivitis is met with in young children two to four weeks old. Occasionally a considerable number of cases of conjunctivitis occur in young children caused by the Pneumococcus, the disease advancing so rapidly that hypopyon is common in 24 hours. In the human subject, it is known that another organism, the *M. Catarrhalis,* not only occurs in the nasal secretions, but is responsible for certain epidemics of conjunctivitis as well as coryzas and bronchial affections resembling influenza. In some localities a condition prevails resembling a form of chronic ulcerative keratitis due to a member of the *M. Catarrhalis* family in which a general superficial erosion of the cornea progresses to infiltration of the more superficial layers, then affecting the deeper structures of the cornea. Consequently introacular tension falls, and eventually sight is lost. *M. Catarrhalis* strikingly resembles the *Meningococcus,* and can only be differentiated by cultural procedure. *M. Catarrhalis* grows on plain agar at room temperature, and does not produce acid on glucose media, whereas the *Meningococcus* requires blood temperature for its growth, and ferments glucose and maltose.

Recently an extensive outbreak of conjunctivitis due to the *M. Catarrhalis* occurred among the calves of a Shorthorn herd in this practice. All the calves in the herd, to the number of twenty, were affected, some of them being up to five months old.

The disease was evidently contagious, and it showed an incubation period of five days. Newly-born calves placed among the affected ones showed symptoms in four to five days. The disease took three weeks to run its course. Lachrymation was very marked, causing complete denudation of the hair below the eyes. Swabs were taken from the eyes of some of the calves, and cultures made on blood agar. The *M. Catarrhalis* was isolated and showed an overwhelming preponderance over other organisms. One of the calves from this herd was sent to another herd six miles away, with the result that all the calves at this place became similarly affected.

In the horse, conjunctivitis is frequently of a pneumococcal nature, especially when of a traumatic origin. In one case which came under my observation, the Pneumococcus was responsible for hypopyon and panopthalmitis preceded by conjunctivitis.

In affections of the eye, toxæmic symptoms are rarely present, the tissues of the body being apparently able to elaborate the necessary antibodies.

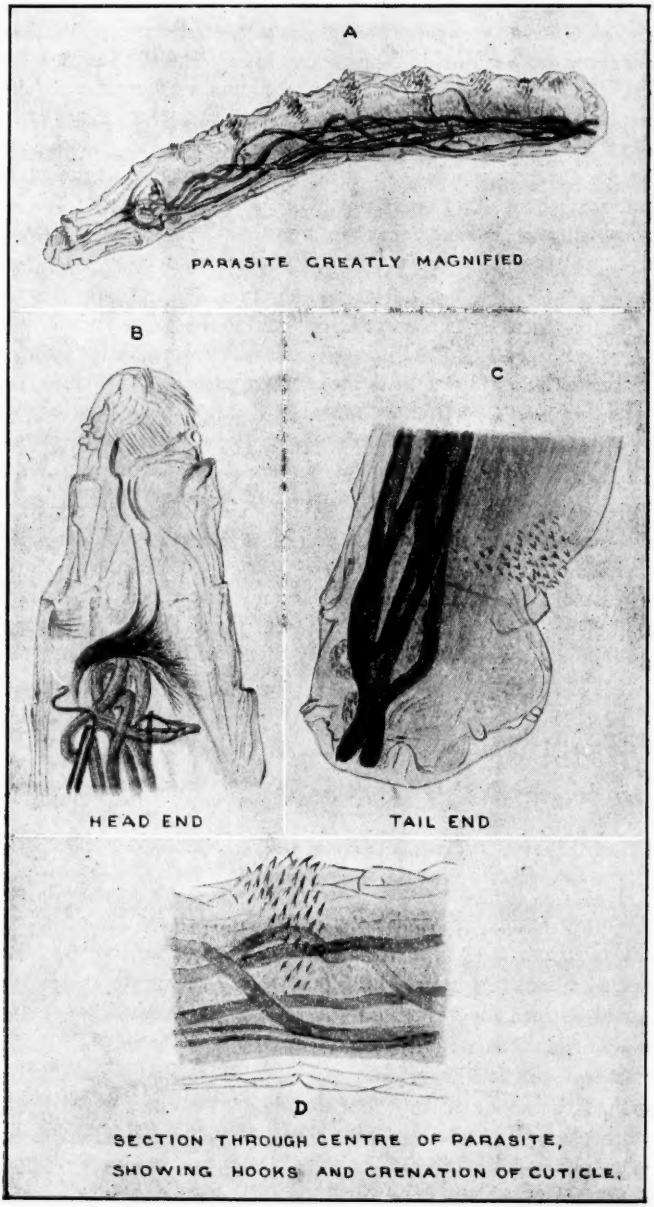
In cattle, interstitial keratitis is often of tubercular origin. In the human subject, also, this condition is frequently due to the *B. Tuberculosis* and also to the *Treponema Pallidum*. Secondary infections are common. Considerable success accompanies vaccine treatment in the human subject when treating bacterial diseases of the eye. Should it not be as successful in Veterinary Medicine?

It is advisable in taking samples of morbid material from the eye to thoroughly flush out the conjunctival sac with normal saline solution, and then to cover with a pad for an hour or so prior to taking the samples.

A PARASITE FOUND IN THE PORTAL VEIN OF A SHEEP.

By E. SEWELL, M.C.
(*Indian Civil Veterinary Department*).

WHILST searching for schistosomes, the parasite illustrated was recovered from the portal vein of a sheep. In the living state, it measures about 1.75 mm. long by .2 broad. Under the microscope it could be seen moving rapidly, its movements resembling those of a caterpillar. From the well-marked nerve ring, with its attendant nerves and ganglia, the rudimentary sexual organs, antennæ and feet, and the structure of the cuticle, it would appear to be a larval diptera. Its armature suggests that it is well adapted for making its way through tissues, the direction of the spines on the back ensuring forward movement.


A
PARASITE GREATLY MAGNIFIED
B
HEAD END
C
TAIL END
D
SECTION THROUGH CENTRE OF PARASITE,
SHOWING HOOKS AND CRENATION OF CUTICLE.

MORTALITY OF DIETETIC ORIGIN IN PREGNANT EWES.

By MAX HENRY, M.R.C.V.S., B.V.Sc.
Department of Agriculture, New South Wales.

THE opportunity was recently presented of investigating a considerable mortality which had taken place amongst pregnant stud ewes on a large farm in the Central Western District of New South Wales. This whole district has undergone a prolonged and severe drought, and when visited (March 12, 1920), there was not a green thing in the way of stock food on the farm. The mortality had occurred amongst a number of Merino ewes of various ages, but mostly 6 and 8-toothed and broken-mouthed, which were to lamb in anything from a fortnight to ten weeks. The total number of deaths up to the date of visit was forty, all under practically the same conditions. This loss occurred during the preceding six weeks. The feed of these sheep consisted of silage three to four years old, which had been stored in pits, and scrub (by which term is meant in this country the lopped branches of various edible trees more or less digestible and nutritive), mostly " Currant Bush " (*Apophyllum anomalum Capparideæ*) and lately some wheaten hay. The silage both looked and smelt well, did not appear to have any fungus or mould on it, and was greedily devoured. The silage had been fed since January 20 at about the average rate of 2½ lbs. per sheep ; the scrub since January 16 at about the rate of 3 lbs. per sheep—but this must be a very vague guess ; and the hay for only about four days at the rate of about 1½ lbs. per diem. These sheep were known as the 2nd and 3rd class stud ewes.

It is important to note the feeding of the other sheep on the farm. The ewe hoggets in an adjoining paddock to those in which mortality had occurred were getting the same feed. The breeding ewes of the special and first class had been in another paddock, which was good enough to feed them, and had only received silage for the last week or so, and scrub for only about four days. An inspection of these ewes showed them to be in superior condition to the 2nd and 3rd class stud ewes amongst which mortality was occurring. Both lots were strong and alert, nevertheless one death occurred amongst the 1st class in the previous week. The rams were living in another paddock on what they could pick up, and the ration sheep on the stubble fields. The flock ewes had been fed on silage in the cultivation paddocks for the last four or five weeks, but had received no scrub. No deaths had occurred amongst any of these sheep, except amongst the flock ewes, two of which had recently died.

The water supply was all from bore water, which is pumped into raised tanks and then runs into troughs.

The summer had been very hot and dry, and was at the time still hot and sultry.

The following cases were seen :—

1. 6-tooth Merion ewe, far advanced in pregnancy, condition good, standing in corner of paddock in listless attitude. On being approached, made no effort to move ; no notice taken of threatened blow or movement made towards the eye with the hand, unless very violent. Head carried a little to one side (left) and slightly raised. On being turned round and pushed it moved a few steps forward with a somewhat groggy action and then stopped. No attempt was made to escape on being recaught. Respiration hurried. *Post-mortem*: Killed by bleeding. Skin and subcutaneous tissues normal. Peritoneal cavity contained about a dessertspoonful of colourless fluid. Peritoneum normal. External surface of abdominal viscera normal. Rumen, reticulum, omasum and abomasum normal internally. Mucous membrane of abomasum pale and a little icteric. Small intestine normal, containing some bile stained fluid. Large intestine normal, but contents in lower part of colon and rectum distinctly hard and dry, one fæcal mass being two inches by 1½ inches and very dry. Some blood staining of fæcal masses in this part. Mesenteric lymphatic glands normal. Omental fat fairly plentiful. Spleen normal. Liver pale, friable, greasy, yellow, no parasitic infestation, normal in size. Gall bladder full, kidneys pale, friable, greasy and yellowish red. Capsule strips normally, no visible lesions. Suprarenal glands apparently normal. Fat surrounding kidneys plentiful, bladder normal, abdominal lymph glands normal, lungs normal, except for one small caseous lymphadenitis abscess. Pleura normal, heart appeared flabby, a little pale in colour, normal in size. Pericardium normal, brain normal ; fluid present in cavity appeared in excess, and meninges were tense when bones were removed. The brain was carefully removed and sliced longitudinally in numerous slices, but no lesions of any sort were visible. Medulla oblongata was treated in the same way and found normal. Eyes normal. Udder showed practically no evidence of approaching functioning. The uterus contained twin lambs, apparently within 2-3 weeks of full time. Both were well grown and without noticeable defect. Viscera of lambs appeared normal. Membranes and cotyledons appeared normal. No turbidity nor evidence of uterine infection of any sort was present.

2. Full mouth Merino ewe. Found in paddock lying down in comatose condition with one eye picked out by crows. Killed by bleeding. Skin normal. No discharge from vulva. Subcutaneous tissues normal with very little external fat. Condition poor. Peritoneum normal, containing a dessertspoonful of clear colourless fluid. Omental fat fair. Rumen full but not distended. Contents dry and solid. Reticulum normal, contents on dry side. Omasum normal,

almost empty. Abomasum normal, contents drier than usual. A few stomach worms (*Hæmonchus contortus*). Mesenteric glands normal. Small intestines normal and fairly empty; contents deeply bile stained. Cæcum contained two masses of very hard and dry ingesta each measuring about 1½ by 1½ inches. Large colon contained two similar masses, but larger and drier. Rectum normal, fæces very hard. Liver pale, yellow, greasy, friable. Portal gland normal. No parasitic infestation of liver. Gall bladder normal, not distended. Bile normal. Kidney, fat, fair. Kidney substance a little pale and soft. Capsules strip easily. Suprarenal capsules rather pale, but otherwise normal. Lungs normal. One caseous lymphadenitis abscess in mediastinal lymphatic gland. Heart normal. Udder showed practically no sign of preparing for milk supply. Gland tissue and lymphatic glands normal. Cranial cavity contained an excess of fluid. Meninges normal, brain tissue normal, spinal cord normal, air sinuses normal. Uterus in normal position and condition, one lamb normally placed. Fœtal membranes, cotyledons, umbilical cord and uterine fluids normal.

Eleven other cases were seen showing in general the same symptoms, and in the case of those that were killed or died, the same post-mortem appearances. An additional symptom noted in various cases was the occurrence of spasms, the ewe when approached moving backwards with stiffened, quivering legs and the head held down into the chest. This condition lasted for a few seconds, and then passed off, and the animal tried to escape normally, but in turning collapsed. Response to external stimuli was very slight and imperfect in most cases. In all cases pregnancy was far advanced. All contained living lambs except one, in which one lamb was found to have been dead some little while, as the cord and cotyledons were discoloured; the lamb a dirty brown colour, and the amniotic fluid turbid. A large blood clot was present in the fœtal membranes. There was a history that this particular ewe was carried on horseback a day or so before. The changes in the liver were the most constant post-mortem lesions and next to that the dry condition of the ingesta and fæces.

In order to obtain a comparison, the opportunity was taken of making a post-mortem examination of a sheep being killed for rations.

Cross-bred ewe; not pregnant; general condition very good. All viscera normal except the liver, which contained one small cyst and was a little greasy, but normal in consistency and colour. Contents of intestines and stomach moist and normal. Although difficult to exactly define by words, the healthy, satisfactory appearance of the digestive organs and their contents, in contrast with those of the ewes previously examined, was most striking.

Ahother ration sheep was also examined, giving the same genera appearance as above, with normal liver.

Advice was given that all sick sheep should be brought up from the paddocks to the small hospital paddock, and fed and watered there, individual sheep being, if necessary, quietly taken up to the trough for water and having feed placed before them, or being taken to the feed trough. That the sick sheep should be fed preferably on green lucerne hay, or failing that, on bran or other laxative nourishing diet. That the ewes in the paddock whence the sick ones were coming should receive a partial ration at least of the same sort. That the quantity of mag. sulph. in the lick should be increased to 20 per cent., and that each sick ewe when brought in should be drenched with mag. sulph. 3 ounces. The administration of Nux Vomica and Calc. Phosphate was also recommended, but owing to the success following the dietetic changes, was not administered. These measures were based on the theory that the whole mortality was due to the ewes having been for a long time during pregnancy fed on a diet which was only a maintenance ration, and though sufficient to support the animal's life, was vitally deficient when the extra drain of advanced pregnancy was superadded. The diet was in part also of a constipating nature. The combined influence of pregnancy and lack of nutritive essentials in the food, plus an auto-intoxication from continued constipation, resulted in a general lowering of the tone of the viscera, and the animals at length arrived in a condition of extreme depression and partial coma. They ceased to make efforts to obtain food and water, rapidly became worse, and died.

The opinion was expressed that mortality could not be expected to cease immediately, no matter what was done, and that unless steps were taken in regard to the feed, mortality amongst the first class ewes might be expected. The matter was dealt with with commendable energy by the manager, the scrub feeding was cut out, and a chaff and bran ration supplied to the stud ewes. This was fed in troughing made out of sacking nailed on either side to wood, either small tree trunks or battens. One foot of troughing was allowed for sheep, and the feeding was economically and easily carried out.

The ewes were divided into lots of 600 in order to prevent overcrowding. As one would expect from the history, the milk supply of the ewes was poor ; most of the lambs, however, were saved. An immediate improvement was noticeable, and from three days after the change of diet, no further cases which could be ascribed to the condition in question occurred.

The ration allowed per sheep was as follows :—

Monday, Wednesday and Friday.—1 lb. chaff and 1 ounce bran, mixed and fed in troughs ; 1 lb. ensilage spread on ground.

Tuesday, Thursday and Saturday.—1 lb. of lucerne hay and 1 lb. ensilage spread out on ground.

Sunday.—1 lb. chaff and 1 ounce bran, fed in troughs, and 1 lb. lucerne hay on ground.

Analyses of the original food supply of the sheep were made by Mr. F. B. Guthrie, the Departmental Chemist, and were as follow :—

	"Silage."	"Currant Bush."
Moisture	58.39	21.48
Albumenoids	3.94	9.62
Ether Extract	0.18	2.13
Ash	4.84	6.66
Fibre	14.79	38.88
Carbohydrates	17.86	21.23

In searching the available literature for references to similar outbreaks, the best description was found in the *Journal of the American Veterinary Medical Association*, August, 1919, entitled, " Stercoremia of Sheep," by E. A. Bruce. In many other instances of mortality in pregnant ewes the point is emphasised that the ewes were in over-good condition, and on full feed, while constipation appears to be regarded as of secondary importance. This was not so in the cases under consideration, and the conclusion reached by Bruce that at least some of the cases which have been diagnosed heretofore as preparturient eclampsia and prepartum paralysis are in reality cases of stercoremia would appear justified. In this instance the constipation was partly due to the fibrous nature of the food, and to lowered tone, consequent on deficient diet.

The whole question is one of very considerable import in this country where drought conditions recur at irregular intervals, and where in only a minority of cases do sheep receive any food beyond what they gather in the paddocks.

OBSTRUCTIONS IN THE VAGINAL PASSAGE OF CATTLE.

By W. C. HAZELTON, M.R.C.V.S.,
Buckingham.

I HAVE recently come across two interesting and uncommon obstructions in the vaginal passages of cattle, the knowledge of the existence of which may be useful to the young practitioner.

One was a strong fibrous band extending vertically from the roof to the floor of the vagina of a heifer which had passed her first calf two days previously. I was called in by the owner on account of some difficulty which he had experienced in trying to remove the placenta membranes. When I arrived I found these to be hanging out of the

vaginal orifice, and apparently prevented from escaping completely by something or other inside. Upon examination I found a tough fibrous band about as thick as a walking-stick extending, as stated above, from the roof to the floor. I cut this through with scissors and the placental membrane at once tumbled out. There was no hæmorrhage, and no need for further treatment.

The second case was one of dystokia, and from the outside nothing was visible, but the cow was straining with labour pains. Upon passing my hand into the vagina I discovered a pedunculated tumour as large as a child's head, completely occluding the passage. After some manipulation I passed this back beyond the pelvis and the calf was delivered without difficulty. The tumour appeared to me to be a lipoma, but I had no further opportunity of examining or removing it, as the cow was sold shortly afterwards.

EMPHYSEMA DUE TO A BONE IN THE ŒSOPHAGUS OF A HEIFER.

By W. C. HAZELTON, M.R.C.V.S.,
Buckingham.

A SHORT time ago I was called to see a yearling heifer Shorthorn which the owner stated to be suffering from indigestion. Upon examination I found a condition of general emphysema, the whole of the body being affected, and extruding from the sub-maxillary space to half way down the neck there was a dropsical swelling, which pitted on pressure.

Respiration was accompanied by painful grunting, and I could see that the animal was almost *in extremis*. She died about an hour later, and post-mortem examination revealed the presence of the shank-bone of a sheep firmly impacted in the œsophagus, about six inches below the pharynx.

The lower end of the bone was jagged, and had made a lacerated hole through the wall of the œsophagus, through which a quantity of food (the contents of the rumen) had escaped and had gravitated downwards into the thorax as far as the heart itself, causing septic pericarditis.

The gases from the rumen had become eructated and had found their way through the jagged wound in the œsophagus into the subcutaneous tissues, causing the extensive emphysema.

I thought that the case was well worth placing on record on this account, as the cause of the emphysema was somewhat of a puzzle to me to diagnose until I had the opportunity of tracing it by the post-mortem examination.

AN INSTANCE OF LONGEVITY IN RINGDOVES.

By FREDERICK HOBDAY, F.R.C.V.S.,
London.

A PAIR of ringdoves, cock and hen, were recently brought to hospital to be painlessly destroyed for certain sentimental reasons. I had personally known the birds for fifteen or sixteen years, and my client had known them since 1900, at which time they were said to be two years old. This would, therefore, make them to be each of the authenticated age of twenty-two years.

They appeared to be in excellent health, and except as stated above, "for sentimental reasons," there was no cause for their destruction. They were put painlessly to sleep with chloroform. Upon looking up the subject in Marshall's "Physiology of Reproduction," I find it stated that canaries are stated to have attained the age of twenty years, a herring gull forty-four, an imperial eagle fifty-six, a heron sixty, eagle owl sixty-eight, raven sixty-nine, swan seventy, and a goose eighty.

EFFECTS OF HYOSCINÆ ON AN ANIMAL AFFECTED WITH BROKEN WIND.

By Captain J. R. HODGKINS, D.S.O., F.R.C.V.S., A.V.C.,
Secunderabad, India.

THE administration of the leaves and other parts of Solanum (*atropa belladonna Datura Stramonium, Hyoscyamus niger*) was, and perhaps is, a resort of unscrupulous horsedealers to relieve temporarily the difficulty of breathing in broken wind. Administration by the mouth relieves the breathing in fifteen minutes, and its effects last a whole day.

The hypodermic injection of these drugs has the same effect, but the relief is afforded for a much shorter period.

A badly broken-winded Australian mare came into hospital for disposal; the character of the respirations was such as to elevate the croup with each double flank movement.

At 10.15 a.m., she was injected subcutaneously with *Hyoscinæ Hydrobromidi* grs.; and ℥iv. of water.

10.25 a.m. Animal, which had previously been feeding hay, ceases to feed and yawns continuously.

10.30 a.m. Breathing considerably improved, double flank respiration almost unnoticeable, no movements of the croup

10.35 a.m. Animal begins to sweat.
10.45 a.m. Bathed in sweat, throwing up the head with spasmodic jerks and stamping with fore feet.
10.55 a.m. Becoming quieter, still dripping with sweat. Breathing almost normal, pupils widely dilated, very cold under the arms.
11.0 a.m. Had the animal trotted; breathing remains practically normal.
11.15 a.m. Sweating has ceased, animal quiet. Breathing normal.
11.45 a.m. Animal dry, pupils widely dilated, quite quiet.
3.15 p.m. Has refused food, but with the exception of the dilated pupils is to all appearance normal.
7.15 p.m. The breathing is just commencing to assume the characteristics of *Emphysema* of lungs. Has eaten a mash.
9.15 p.m. Double flank action is resumed.
Dilatation of pupils lasted three days.

Abstracts.

THE POSSIBLE USE OF *AZOLLA FILICULOIDES* AS A DETERRENT TO ANOPHELINE BREEDING.

By Captain MALCOLM E. MacGREGOR.
Royal Army Medical Corps.
Officer in Charge, Entomological Laboratory, Sandwich, Kent.

One of the activities of this laboratory during the past summer has been the careful study of anopheline breeding places in regard to the association of the larvæ with the common water weeds of this locality, to see whether there are any weeds inimical to the larval development.

In this work I have had the help of Captain G. Bryce, R.A.M.C., and his expert botanical knowledge. Captain Bryce while he was here collected a very large number of water weeds from the ponds in and around Sandwich, and prepared named specimens for the laboratory. Most of the weeds were subsequently studied individually as to their influence, if any, upon the development of anopheline larvæ in our artificial anopheline breeding ponds.

None of these plants were found, however, to have any marked effect one way or another upon the development, although our records show that the larvæ certainly prefer some to others.

Later, in a strip of dyke about a mile from the laboratory *Azolla filiculoides* was found to be growing luxuriantly, and forming a veritable carpet over the water surface. I had some of this plant brought to the laboratory and tested in the same way on the anopheline larvæ, but it too had no effect on the development.

The plant, which is exceedingly beautiful, being at some times of the year green, and at others of a magenta colour, was placed in one of our anopheline breeding tanks simply because of its ornamental qualities. The plant spreads rapidly, and in a week it had completely covered the surface of the water. At this time of the year the numbers of the local anophelines (*A. maculipennis* and *A. bifurcatus*) were at their height, and natural oviposition took place every night in our breeding tanks, so that large numbers of larvæ were constantly being added to our supply. Whenever larvæ were wanted in the laboratory it was the custom to make a "dip" into one of the tanks. It soon became obvious that the numbers of larvæ in the tank containing the azolla were speedily reducing, and in about a fortnight when all that had been present previously had pupated and emerged no others were obtainable, in spite of the fact that the other tanks contained enormous numbers of larvæ at all ages.

Some of the water of the azolla tank and a supply of the weed was then placed in a large circular dish and about 100 larvæ added. A control dish with the same water and the weed *Entromorpha intestinalis* was placed near by. The dishes were placed near the tanks and carefully observed each day. It was again found that the *A. filiculoides* had no detrimental effect on the larval development, *but whereas in the control dish large numbers of ova were laid each night by the wild anophelines no ova was deposited in the dish containing the azolla* which carpeted the surface of the water.

The azolla tank was left undisturbed throughout the season, except to be tested three times a week for the presence or absence of larvae. In spite of the fact that the wild anophelines were abundant and laid continuously in the other tanks no larvæ were ever found in the azolla tank.

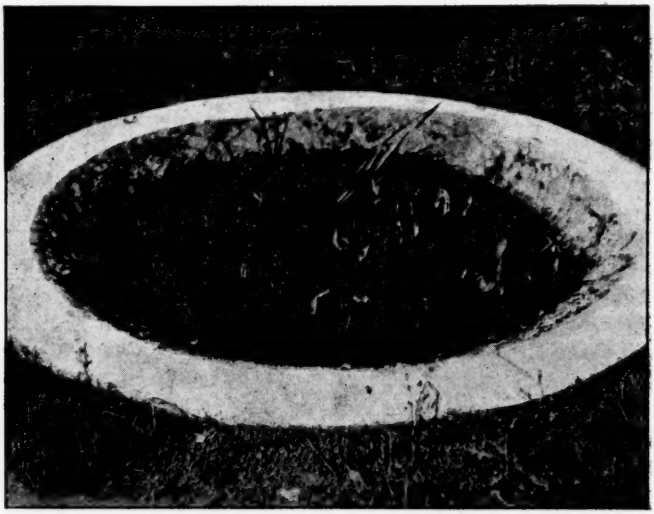
It is too late this season to do much more with the plant to gauge its possibilities in the natural ponds as a deterrent to anopheline breeding, by introducing this plant from the one source of supply I know of near Sandwich (and where, by the way, no larvæ have ever been found) into the other ponds where the anophelines breed in large numbers. I am, however, sure that this plant should prove next year, when this work can be done, of very great value.

A. filiculoides is, as I have already said, exceedingly beautiful, carpeting the water with its foliage as a light green or a bright magenta

pile according to the stage of growth in a remarkable manner. It is in this way very different to many of the common water plants of stagnant pools which so often, to the average person, are unattractive and unsightly forms of vegetation.

The plant belongs to the fern family, and is, I understand, a comparatively recently imported exotic from Canada.

It is a floating plant with compact leaves forming a spongy mass raised about ½ inch above the water surface. The roots are thread-



Azolla filiculoides growing in one of the laboratory artificial breeding tanks. Note the water surface completely covered by the weed and the weed's close contact with the other water plants, which it is indeed in process of enveloping.

like and are about 1½ ins. in length. There is no attachment either to the sides or bottom of the pond, and the plant may be gathered in masses by simply scooping it from the surface. In this manner a pond is very easily cleared of the weed if necessary. Its spreading powers are astonishing, and a single plant will, in the course of a fortnight cover a large area. In fact, the covering of the water surface seems one of the aims of the plant, the smaller weeds being speedily smothered and killed out.

It is upon this power of completely covering the water surface that its deterrent action to the breeding of anophelines rests. Apparently the female anopheline mosquito must have an open water surface on which to lay her eggs in nature.

I have found by experiment here that the anopheline ova, even when the embryo is fully developed within the egg, cannot withstand drying for much longer than six hours, and whereas *Stegomyia fasciata* will generally lay its eggs *upon* damp water weeds floating on the water surface, the anophelines always lay their eggs on the water surface itself, seeming to avoid weeds as much as possible.

It is probable, therefore, that the female anopheline regards an azolla covered pond as a highly dangerous place as far as her eggs are concerned, since the ova are not capable of resisting desiccation to any extent, and it would be difficult for her, if not impossible, to reach the water surface in such a pond.

I look forward, therefore, with interest to introducing *A. filiculoides* into some of the chief anopheline breeding ponds next year, and anticipate considerable success by the use of this plant in rendering ponds unsuitable breeding places that have served the anophelines admirably heretofore.

I am indebted to the Director of the Royal Botanical Gardens, Kew, for the following information concerning *Azolla filiculoides*, Lam.

"The genus Azolla, Lam., belongs to the family Salviniaceæ, which was formerly placed in the Rhizocarpæ, but now in the heterosporous pteridophyta.

"*A. filiculoides*, Lam., is a native of the western side of America from California to Chile, and in the Andes ascends to an altitude of 16,000 feet. An account by W. J. Campbell of its structure and life-history can be found in the 'Annals of Botany,' Vol. VII, pp. 155-187, tt. 7-9. It has been naturalised in many parts of Britain, and a résumé of this by A. S. Marsh has been published in the *Journal of Botany*, 1914, pp. 209-213, and supplementary notes in the same Journal by W. H. Burrell in 1914, p. 269, and H. Peirson, 1915, p. 308. It is propagated by means of male and female spores, which are produced freely, and towards the end of the season the plant turns from green to red, in a similar manner to the autumn tints of some trees."—*Journal of R.A.M.C.*

ANÆSTHETICS FOR ANIMALS.

THE undermentioned paragraph will interest members of our profession. Let us hope that it is published solely in the interest of the animal world, and that the same attention will be devoted to those who do not possess a veterinary diploma, but who operate upon animals notwithstanding.

Anæsthetics for Animals.

We have reason to believe the less responsible of the veterinary surgeons are altogether ignoring the provisions of the Animals (Anæsthetics) Act, which was passed some months ago, and we shall be glad to have any instance reported to us.—"John Bull," July 24.

THE ANTHELMINTIC AND INSECTIDAL VALUE OF CARBON BISULPHIDE AGAINST GASTRO-INTESTINAL PARASITES OF THE HORSE.*

By MAURICE C. HALL, PH.D., D.V.M., MORGAN J. SMEAD, V.S., B.V.Sc. AND CHARLES F. WOLF, D.V.M.
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BY critical experimental methods, *i.e.*, treatment followed by careful examination of the manure and post-mortem examination, it has been found by Hall (1917) that carbon bisulphide is apparently 100 per cent. effective against bots ; by the same method, it has been found by Hall, Wilson and Wigdor (1918) that some of the common anthelmintics are not adequately effective against ascarids in the horse, even such drugs as oil of chenopodium, highly ascaricidal for ascarids in other hosts, falling far short of 10 per cent. efficacy. Using these same critical methods, we find that carbon bisulphide, in addition to being 100 per cent. effective in removing bots, is almost that effective in removing ascarids. This drug has been used heretofore against ascarids in the horse, but in the absence of critical tests, its real efficacy was a problematical quality. We are now able to report that in carbon bisulphide we have a dependable remedy for the refractory ascarid of the horse. This information fills a distinct gap in our knowledge of dependable treatments for parasites of the horse, and in connection with the findings of Hall, Wilson and Wigdor (1918) to the effect that oil of chenopodium, properly used, is approximately 100 per cent. effective against strongyles, cylicostomes and pinworms in the horse, it establishes the topic of anthelmintic treatment for the common parasites of the digestive tract of the horse on a sound basis of tested and dependable drugs.

Our method was the same as that used by Hall, Wilson and Wigdor. The horses were dosed by, and the fasting, feeding and care of manure supervised by, one of us (Smead). The examination of the manure for worms and bots passed and the post-mortem examination of the digestive tract were made by Hall, Smead and Wolf, assisted by J. R. Stafford. No effort was made to detect cylicostomes in the manure or to count them post-mortem. However, if cylicostomes had been present in the manure to any extent they would probably have been detected, and it is our opinion that practically none were passed.

Food was removed from eight horses at noon, March 10th, 1919, and the animals were given their first, or their only, treatment with carbon bisulphide in hard capsules about 8.30 the next morning. No purgatives were given. In view of the new data relative to the

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time required for dead bots and worms to pass from a horse under these conditions, we give the protocols rather fully.

Horse No. 1094 was given 6 drams of carbon bisulphide in one dose. On the succeeding days, in their order, this horse passed the following: one bot, no ascarids; two bots, no ascarids; 58 bots, one ascarid; total 61 bots, one ascarid. The horse was killed the third day after treatment and had 105 dead bots and five dead ascarids in the large intestines on their way out. The drug removed 166 bots and six ascarids, leaving none in the stomach or small intestine. This horse had 85 pinworms, hundreds of *Strongylus* spp. and thousands of *Cylicostomum* spp. The treatment was therefore 100 per cent. effective against bots and ascarids and 0 per cent. effective against pinworms, *Strongylus* spp. and *Cylicostomum* spp. (We assume from the number of cylicostomes left, together with the failure to remove *Strongylus* and pinworms, that the treatment was an entire failure against cylicostomes, even though the manure was not closely examined to see if any of these were passed.) The stomach and small intestine were normal.

Horse No. 1093 was also given 6 drams of carbon bisulphide in one dose. On the succeeding day this horse passed bots as follows: No bots; 8 bots; 70 bots; 77 bots; 36 bots; 48 bots; 33 bots; 5 bots; 2 bots; total, 279 bots. This horse passed two ascarids on the third day after treatment and two or three at a later day; owing to a misunderstanding, exact records were not kept for these worms. The horse was killed the ninth day after treatment and had two bots in the double colon and no ascarids anywhere. This horse had one pinworm, hundreds of *Strongylus* spp. and some *Cylicostomum* spp. The treatment was therefore 100 per cent. effective against bots and ascarids and 0 per cent. effective against pinworms, *Strongylus* spp. and *Cylicostomum* spp. The stomach showed a healing inflamed area in the cardiac portion.

Horse No. 1092 was given 4 drams of carbon bisulphide at one dose, and this dose was repeated two hours later. On the succeeding day, in their order, this horse passed the following: No bots, no ascarids; no bots, one ascarid; no bots, four ascarids; total no bots, five ascarids. The horse was killed the third day after treatment, and had no bots anywhere; it had two live ascarids in the small intestine and 38 dead ones in the large intestine. There were nine *Strongylus* spp., some *Cylicostomum* spp. and no pinworms. The treatment was therefore over 95 per cent. effective against ascarids and 0 per cent. effective against *Strongylus* and *Cylicostomum* spp.; no data regarding bots and pinworms, as these parasites were not

present. Cardiac stomach was inflamed and showed adherent mucous exudate.

Horse No. 823 was also given two 4-dram doses of carbon bisulphide at a two-hour interval. On the succeeding days this horse passed the following: One bot, no ascarids; no bots, two ascarids; one bot, ten ascarids; one bot, four ascarids; no bots, six ascarids; no bots, three ascarids; no bots, no ascarids; no bots, one ascarid; total three bots, 26 ascarids. Subsequent to the eighth day after treatment, no bots or ascarids were passed. The horse was killed on the seventeenth day after treatment and had no bots or ascarids anywhere. There were hundreds of *Strongylus*, thousands of *Cylicostomum* and no pinworms. The treatment was therefore 100 per cent. effective against bots and ascarids, and 0 per cent. effective against *Strongylus* and *Cylicostomum*. In passing, it may be noted that the small number of bots present in this horse is correlated with the fact that this animal had not been on pasture the previous summer, but had been kept in the stable or allowed in a bare lot for exercise. The inflammation of the gastric musoca, following treatment, had almost entirely subsided.

Horse No. 1091 was also given two 4-dram doses of carbon bisulphide at a two-hour interval. On the succeeding days this horse passed bots as follows: 0, 7, 13, 6, 4, 2, 2, 0, 1, 0, 0, 0, 0, 0; total, 35 bots. This horse also passed three ascarids, but the exact date was not recorded. The horse was killed on the fourteenth day after treatment and had not bots or ascarids post-mortem; it had hundreds of *Strongylus* spp. and numerous *Cylicostomum* spp., but no pinworms. The treatment was therefore 100 per cent. effective against bots and ascarids, but 0 per cent. effective against *Strongylus* and, apparently, *Cylicostomum*. There are no conclusions regarding pinworms, as these were not present. There had been some inflammation in the cardiac stomach, but this had almost entirely subsided at the time of necropsy.

Horse No. 897 was also given two 4-dram doses of carbon bisulphide at a two-hour interval. On the succeeding days, this horse passed no bots. At some date it passed one or two ascarids, but, owing to a misunderstanding, no records of the number of worms or the date were kept. The horse was killed on the fourteenth day after treatment and was found to have no bots. There was one live ascarid in the small intestine. The horse had four pinworms, numerous *Strongylus* and some *Cylicostomum*. The treatment was not entirely successful against ascarids in this case, removing one or more and leaving one. This is probably due to the worm being in the lower ileum and the drug being largely absorbed before reach-

ing the site of the worm. The treatment was 0 per cent. effective against pinworms, *Strongylus* and, apparently, *Cylicostomum*. There are no conclusions in regard to bots, as there were none present. This freedom from bots is correlated with the fact that this animal had been kept off pasture the preceding summer. The stomach of this animal showed evidence of an inflammation, in the cardiac portion, that had almost entirely subsided.

Horse No. 1100 was given three doses of three drams each of carbon bisulphide at one-hour intervals. On the succeeding days this horse passed the following: No bots, no ascarids; 31 bots, four ascarids; 58 bots, two ascarids; 29 bots, no ascarids; 14 bots, no ascarids; 13 bots, no ascarids; total 145 bots, six ascarids. The horse was killed the sixth day after treatment and had 15 dead bots in the large intestine and no ascarids anywhere. There were four pinworms, hundreds of *Strongylus* spp. and some *Cylicostomum* spp. The treatment was therefore 100 per cent. effective against bots and ascarids and 0 per cent. effective against pinworms, *Strongylus* spp. and *Cylicostomum* spp. A considerable portion of the cardiac stomach was highly inflamed.

Horse No. 1106 was given the same treatment, three doses of three drams each at one-hour intervals. On the succeeding days this horse passed the following: No bots, no ascarids; 17 bots, one ascarid; 12 bots, one ascarid; seven bots, no ascarids; six bots, no ascarids; one bot, no ascarids; no bots, no ascarids; no bots, no ascarids; no bots, no ascarids; one bot, no ascarids; total 44 bots, two ascarids. After the tenth day no parasites were passed. The animal was killed on the seventeenth day. One dead bot was found in the double colon and no ascarids anywhere. There were numerous *Strongylus*, innumerable *Cylicostomum* and no pinworms. Treatment was therefore 100 per cent. effective against bots and ascarids, and 0 per cent. effective against *Strongylus* and, apparently, *Cylicostomum*. The inflammation of the gastric mucosa had almost entirely subsided.

A consideration of the foregoing shows the following:—

Carbon bisulphide has a dependable efficacy of approximately 100 per cent. against bots and ascarids, the two common and important parasites occurring in the anterior portion of the digestive tract, *i.e.*, the stomach and small intestine, of the horse. In our animals, the bots were mostly *Gastrophilus nasalis*, with a few *G. hemorrhoidalis*; the ascarids were the common *Ascaris equorum* (*A. megalocephala*). In our experiments, it was uniformly 100 per cent. effective against bots, removing all of 690 bots from the six infested animals, and usually 95 to 100 per cent. effective against

ascarids, removing (approximately) 91 of 94 worms from the eight infested animals, or almost 97 per cent.

Carbon bisulphide gives as good results in one 6-dram dose as in two 4-dram doses or three 3-dram doses, and it is likely that the smaller sum total of drug in the one dose is to be preferred to the greater total in several doses, especially as the gastric lesions seem less pronounced with the one dose. It is quite possible that further experiment will show that a single dose even smaller than six drams will be adequate. Dove (1918) found that young bots could be killed by carbon bisulphide in 45 minutes, while last-stage larvæ required almost 3½ hours, *G. intestinalis* being more resistant than other species. The question as to whether carbon bisulphide in one dose remains in the stomach long enough to remove the bots, and perhaps remains as much as 3½ hours, would seem to be answered in the affirmative by the success of our one-dose treatment.

Carbon bisulphide given without purgation will remove the bots, but they will usually not be found in the manure for the first 24 hours after treatment, and the maximum number are apt to be in the manure of the third day, and may be in that of the fourth day after treatment. Dead bots may be passed for 10 days and others may still be present in the large intestine 17 days after treatment. Where purgation is employed, bots may come away in the first 24 hours, according to Dove (1918), usually the following day, however, and may come away for five days, according to the findings of Hall (1917) and Dove (1918).

Ascarids usually come away on the second and third day, but may come away as late as the eighth day.

Carbon bisulphide is of no value against worms in the posterior portion of the digestive tract, the cecum, colon and rectum, *i.e.*, against pinworms, *Strongylus* and *Cylicostomum*. This is perhaps due to the rapid absorption of the drug in the stomach and small intestines, and this may account for the occasional escape of an ascarid located in the lower portion of the small intestine. The simultaneous administration of linseed oil might serve to carry the carbon bisulphide in solution down the intestine more rapidly, increasing its efficacy against ascarids. Whether it would cause the removal of any worms from the large intestine is doubtful. Hall (1919) has reported two experiments where horses given a 20-mil dose of carbon bisulphide, or two such doses at two-hour intervals, followed in 1½ to 2½ hours by 800 mils of linseed oil, entirely failed to remove any strongyles.

In this connection, it may be said that the carbon bisulphide is soluble in oils, but is practically insoluble in water; Dove (1918)

is in error in stating : " The carbon bisulphide, being soluble in water, evidently reaches all portions of the stomach, either as a gas or in solution." A common laboratory test for iodine is that employing a discrete undissolved bubble of CS_2 at the bottom of an aqueous solution.

Obviously, adequate anthelmintic treatment for removal of all the common species of worms and bots from the horse would require consecutive treatments with carbon bisulphide and oil of chenopodium, the two anthelmintics now known to be dependable for the purpose.

The lesion due to carbon bisulphide given in hard capsules consists in inflammation in the cardiac portion of the stomach, usually over an area the size of a man's hand or larger. This inflammation, when present, subsides almost entirely in the course of two weeks. The fact that horse No. 1094 had a normal stomach on the third day after treatment with one 6-dram dose, suggests that this single-dose treatment occasions less local damage than repeated doses ; certainly the amount of toxic drug absorbed is less.

REFERENCES.

DOVE, W. E. 1918. *Some Biological and Control Studies of* Gastrophilus hæmorrhoidalis *and other Bots in Horses.* U.S. Dept. Agric. Bull. 597, April 9, 52 pp., 5 pls., 4 text figs.

HALL, MAURICE C. 1917. *Notes in regard to Bots,* Gastrophilus *spp.* J. Am. Vet. Med. Assn., v. 5, (2) Nov., pp. 177-184. 1919. *Practical Methods of Treatment for Worm Infestation.* J. Amer. Vet. Med. Ass., v. 8 (1), Apr., pp. 24-45, 1 fig.

HALL, MAURICE, C. ; ROBERT H. WILSON ; and MEYER WIGDOR. 1918. *The Anthelmintic Treatment of Equine Intestinal Strongylidosis.* J. Am. Vet. Med. Ass., v. 7 (1), Oct., pp. 47-55. 1918. *Some Notes on the Treatmert of Equine Ascariasis and Oxyuriasis.* J. Am. Vet. Med. Ass., v. 7 (1), Oct., pp. 56-57.

DESTROYING INCURABLE DOGS WITH CHLORAL AND STRYCHNINE.

By JAKOB.

THE Dutch veterinary surgeon, Jakob, describes the symptoms observed in two dogs destroyed by the above methods. The first weighed 11 kilos., the second 30 kilogrammes ; the former received a rectal injection of 30 grammes of chloral dissolved in 60 grammes of gum arabic mucilage, being 1 gramme per kilo weight ; the other received 2 grammes per kilo of live weight. When the anæsthetic effect was produced the animals were chloroformed. The different phases were as follows :—

First Dog :

Two minutes after injection the dog was calmer. Five minutes. The reflexes notably less. Six minutes : The palpebral reflex has disappeared ; the pupillary reflex still exists ; defecation ; the tongue

hangs out of the mouth Nine minutes: The dog sleeps peacefully and no longer hears anything; Ten minutes: Prolapse of the membrana nictitans; pulse still strong, 150 per minute; respiration, slightly accelerated but calm. Twelve minutes: Wadding soaked in chlorofrom is applied to the nasal cavities; the dog does not budge; its respirations accelerated and become more superficial; the pulse is feeble and intermittent. Twenty-two minutes: Suspension of respiration; the heart still beats lightly. Finally, the heart ceases to beat after twenty-four minutes.

Second Dog:

Twelve minutes: The dog cannot rise. Twenty minutes: Anæsthesia is complete; disappearance of the greater part of the reflexes; pulse 152°, slightly arythmic; the dog no longer hears; respiration more frequent and more superficial. Twenty-two minutes: Profound sleep; chloroform is administered; the dog does not make the least movement; respiration deeper. Twenty-five minutes: Arrest of respiration and afterwards heart stops.

Three other dogs which received 1 to 2 grammes did not show peaceable sleep, but showed a period of 5 to 10 minutes' excitement, at the same time they set up howling. These dogs were not very ill, but in ailing subjects chloral is a very good narcotic. In order to obtain more rapid death in incurable subjects, the author practises intra-pulmonary or intra-cardiac injection of 15 to 35 centigrammes of nitrate of strychnine. Immediately after this injection, the dogs showed tetanic contractions over the whole body, with frequent short remissions. It may be noted that after death, one observed the absence of all the characteristic manifestations of death by strychnine and the carcase is indistinguishable from that of any other dog poisoned by any other toxic substance. Some dogs immediately after the disappearance of tetanic contractions, show violent clomic contractions of all the limbs; at the same time oscillatory nystagmus appears.—*Annales de Medicine Vétérinaire.*

G. M.

Review.

VETERINARY MATERIA MEDICA AND THERAPEUTICS. By KENELM WINSLOW, B.A.S., M.D.V., M.D., Major, M.C., U.S.A., with a chapter on Biological Therapeutics by Dr. A. Eichhorn. Eighth edition, revised. Published by American Veterinary Publishing Co., 9, South Clinton St., Chicago.

THE usefulness of this book is shown by the fact that it has gone into its eighth edition. It has been brought fully up to date in accord

with the 9th edition of the United States Pharmacopœia. Many prescriptions of value are given throughout the book, and the subjects of anthelmintics and biological therapy have received the attention of two authorities on the subject in the persons of Dr. Maurice C. Hall and Dr. A. Eichhorn. Articles on the thyroid and adrenal glands are of special interest, as is also the hive of instruction on lavage on pp. 522, 523, 524. The arrangement of the matter in the volume is similar to that followed in most materia medica works, but an exception occurs in the form of a welcome section of 73 pages on "General therapeutic measures."

An epitome of modern treatment of diseases forms a handy *aide-memoire* to the veterinarian.

The work is quite a handy one for us on this side of the water, and in some cases it may broaden our outlook and strengthen our hands against disease.

The matter of anæsthetics being much to the front at present, it may be interesting to give the following quotation:—The mortality is, in 3,162 chloroformisations, and in 16,302 etherisations in over a million cases in human practice (Hewitt). Chloroform is 3½ times more depressant to nerve centres, 8 times more depressant to the heart, and causes 5 times more deaths than ether." But the author holds that all the advantages are in favour of chloroform except that of safety, and then he adds, "Ether is more expensive than chloroform, but cheaper than a funeral." G. M

Personal.

At the recent meeting of the National Veterinary Association in Edinburgh it was announced that the *Veterinary Record* had been purchased from the present proprietors, and would in future be carried on as the official organ of the Association under the Editorship of Mr. Malcolm, F.R.C.V.S., the present Secretary. Subscription to the Association will include the subscription to the paper, a most excellent idea, which must be beneficial both to the National Association and to the *Veterinary Record*. With so energetic and moderate an editor as Mr. Malcolm is known to be, we are sure that the paper will have a very successful future, and with so large and influential a clientele there should be no difficulty in obtaining a full supply of valuable clinical and other material which cannot but be beneficial reading for the whole profession.

Congratulations to our distinguished colleague Inspector-General Fray, the Head of the Veterinary Service in the French Army, on being awarded the decoration of Commander of the Legion of Honour.

The difficulties which some of our Colonial workers have to deal with are exemplified by a paragraph from the report of Mr. F. R. Brandt, M.R.C.V.S., Chief Veterinary Officer for the Northern Provinces of Nigeria. Quoting from the Report, we read:—"For the prevention and spread of disease, segregation and isolation are attempted, and in some instances carried out in a fairly satisfactory manner; but to expect to deal with contagious disease in a country of about 250,000 square miles containing over half a million head of cattle, with a staff consisting of two veterinary officers and a number of natives who require constant supervision is absurd.

"When Nigeria is provided with an adequate staff of Veterinary Officers and a Research Laboratory where diseases can be investigated and vaccines and sera manufactured, some results may be expected."

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